GreenView and GreenLand Applications Development on SEE-GRID Infrastructure

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The GreenView and GreenLand applications [1] have been developed through the SEE-GRID-SCI (SEE-GRID eInfrastructure for regional eScience) FP7 project co-funded by the European Commission [2].
The development of environment applications is a challenge for Grid technologies and software development methodologies. This presentation exemplifies the development of the GreenView and GreenLand applications over the SEE-GRID infrastructure by the Grid Application Development Methodology [3].

Today's environmental applications are used in vary domains of Earth Science such as meteorology, ground and atmospheric pollution, ground metal detection or weather prediction. These applications run on satellite images (e.g. Landsat, MERIS, MODIS, etc.) and the accuracy of output results depends mostly of the quality of these images. The main drawback of such environmental applications regards the need of computation power and storage power (some images are almost 1GB in size), in order to process such a large data volume. Actually, almost applications requiring high computation resources have approached the migration onto the Grid infrastructure. This infrastructure offers the computing power by running the atomic application components on different Grid nodes in sequential or parallel mode.

The middleware used between the Grid infrastructure and client applications is ESIP (Environment Oriented Satellite Image Processing Platform), which is based on gProcess platform [4]. In its current format, gProcess is used for launching new processes on the Grid nodes, but also for monitoring the execution status of these processes.

This presentation highlights two case studies of Grid based environmental applications, GreenView and GreenLand [5]. GreenView is used in correlation with MODIS (Moderate Resolution Imaging Spectroradiometer) satellite images and meteorological datasets, in order to produce pseudo colored temperature and vegetation maps for different geographical CEE (Central Eastern Europe) regions. On the other hand, GreenLand is used for generating maps for different vegetation indexes (e.g. NDVI, EVI, SAVI, GEMI) based on Landsat satellite images. Both applications are using interpolation and random value generation algorithms, but also specific formulas for computing vegetation index values.

The GreenView and GreenLand applications have been experimented over the SEE-GRID infrastructure and the performance evaluation is reported in [6]. The improvement of the execution time (obtained through a better parallelization of jobs), the extension of geographical areas to other parts of the Earth, and new user interaction techniques on spatial data and large set of satellite images are the goals of the future work.

References

[1] GreenView application on Wiki, http://wiki.egee-see.org/index.php/GreenView

[2] SEE-GRID-SCI Project, http://www.see-grid-sci.eu/

[3] Gorgan D., Stefanut T., Bâcu V., Mihon D., Grid based Environment Application Development Methodology, SCICOM, 7th International Conference on "Large-Scale Scientific Computations", 4-8 June, 2009, Sozopol, Bulgaria, (To be published by Springer), (2009).

[4] Gorgan D., Bacu V., Stefanut T., Rodila D., Mihon D., Grid based Satellite Image Processing Platform for Earth Observation Applications Development. IDAACS'2009 - IEEE Fifth International Workshop on "Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications", 21-23 September, Cosenza, Italy, IEEE Published in Computer Press, 247-252 (2009).

[5] Mihon D., Bacu V., Stefanut T., Gorgan D., "Grid Based Environment Application Development – GreenView Application". ICCP2009 - IEEE 5th International Conference on Intelligent Computer Communication and Processing, 27 Aug, 2009 Cluj-Napoca. Published by IEEE Computer Press, pp. 275-282 (2009).

[6] Danut Mihon, Victor Bacu, Dorian Gorgan, Róbert Mészáros, Györgyi Gelybó, Teodor Stefanut, Practical Considerations on the GreenView Application Development and Execution over SEE-GRID. SEE-GRID-SCI User Forum, 9-10 Dec 2009, Bogazici University, Istanbul, Turkey, ISBN: 978-975-403-510-0, pp. 167-175 (2009).